California Wildlife Habitat Relationships System
California Department of Fish and Game
California Interagency Wildlife Task Group

Klamath Mixed Conifer

Gary L. Benson

Vegetation

Structure-- Klamath-enriched mixed conifer (KMC) habitats typically are tall, dense to moderately open, needle-leaved evergreen forests with patches of broad-leaved evergreen and deciduous low trees and shrubs (Küchler 1977). On favorable mesic sites with little disturbance, the habitat is dominated by tall evergreen conifers up to 60 m (200 ft) in height with a rich shrub layer and well-developed herbaceous layer (Sawyer and Thornburgh 1977). On more xeric sites, the habitat is generally open, but very diverse forest land (Sawyer and Thornburgh 1977) having a well developed shrub layer.

Composition-- The overstory layer is characterized by a mixture of conifers. Dominant conifers in the western portion of this habitat are white fir and Douglas-fir. In the east, dominant conifers are white fir, Douglas-fir, ponderosa pine, incense cedar and sugar pine. Other conifers in the overstory layer include Shasta red fir, Sierra lodgepole pine, mountain hemlock, western white pine, knobcone pine, Jeffrey pine and Brewer spruce. In a few isolated stands, other relic conifers include Pacific silver fir, subalpine fir, Port-Orford-cedar, Alaska-cedar, and Engelmann spruce. Occasional broad leaved trees include Sierra chinquapin, canyon live oak and California black oak. Pacific yew occurs as a small tree in the understory (D. A. Thornburgh, Dept. of Forestry, Humboldt State University, Arcata, Calif., pers. comm.; Parker and Matyas 1981) .

At higher elevations, red fir and mountain hemlock are more prevalent with occasional whitebark pine and foxtail pine (D. A. Thornburgh, pers. comm.). At lower elevations or on more xeric sites, ponderosa pine becomes more prevalent and white fir and Douglas-fir are reduced. Jeffrey pine is the principal overstory species found on ultramafic soils and serpentine outcrops (Küchler 1977, Sawyer and Thornburgh 1977).

Dense forests have a very rich shrub layer which can include Sierra laurel, Sadler oak, dwarf rose or western thimbleberry. In open-to-moderately dense forests, shrub-size plants in the subcanopy include small individuals of overstory species, especially Shasta red fir and white fir, as well as bitter cherry, Sierra chinquapin, pinemat manzanita, squawcarpet, huckleberry oak, Oregon-grape, greenleaf manzanita, dwarf rose, snowberry, and juneberry (Küchler 1977, Parker and Matyas 1981). The herbaceous layer is well developed and includes twinflower, American trailplant, queencup beadlily, western rattlesnake plantain, sweet-scented bedstraw, chimaphila spp., Idaho fescue, and tufted pinegrass (Sawyer and Thornburgh 1974). Additional detailed information about the species composition in this habitat is contained in Sawyer and Thornburgh

(1974).

Other Classifications-- Other names for Klamath-enriched mixed conifer habitat include Mixed Conifer-Klamath Enriched Series (Parker and Matyas 1981), Klamath Montane Forest with Yellow Pine and Klamath Montane Forest with Douglas Fir (Küchler 1977), and Enriched Conifer Forest (Thorne 1976). It is included in the Red Fir Forest by Munz and Keck (1973) and in the Mixed Evergreen Zone by Proctor (1980). Cheatham and Haller (1975) further divide Klamath-enriched Conifer Forest into Siskiyou Enriched Conifer (8.541) and Salmon-Scott Enriched Conifer Forest (8.542). Sawyer and Thornburgh (1977) include Klamath-enriched Mixed Conifer habitat in the category of Abies magnifica Zone and in the upper elevations of the Abies concolor Zone of the "Klamath Montane Forests".

Habitat Stages

Vegetation Changes-- 1;2-5:S-D;6. Sawyer and Thornburgh (1977) indicate that the early successional stage is usually dense montane chaparral which originates from buried seed. This chaparral is dominated by manzanita, huckleberry oak, golden chinquapin, tobaccobrush and bitter cherry. This shrub stage is followed by a dense young growth conifer forest. According to Proctor (1980), the Klamath-enriched mixed conifer habitat goes through different successional stages following disturbance or manipulation. In general, these types presented by Proctor are early seral grassland, early seral shrub, young or second growth (conifer) forest and mature or old growth (conifer) forest. Sawyer and Thornburgh (1974, 1979)(No 1979 Lit Cite.) have identified several plant communities within the Klamath-enriched mixed conifer habitat that are considered to be potential or climax plant communities. They indicate that in some of these potential communities successful reproduction of most of the overstory species occurs in the understory indicating that the communities are perpetuating themselves.

Duration of Stages-- Whittaker (1960) indicates that some forest trees in the Siskiyou Mountains are several centuries old. His studies also indicate that frequent fires were common, with older trees surviving intensive burns and continuing to dominate the upper levels of the tree strata. He concludes that portions of this habitat are stable for several centuries before natural disturbance restarts the process of succession. He further concludes that many vegetative units exhibited stability in spite of frequent fires and should be regarded as fire-adapted vegetation of a summer-dry climate. Commonly the plant communities in this habitat are 200 years old or younger. Often these communities have old growth conifers with deep fire scars, indicating the ability to persist in spite of fires. The mixed conifer communities of the eastern Klamath region are stable, with frequent light fires. The mixed conifer communities of the western Klamath region are usually burned enough to revert to the montane chaparral type (D. A. Thornburgh, pers. comm.).

Biological Setting

Habitat-- The Klamath-enriched mixed conifer habitat is bound ed by many other wildlife habitats. At the lower westernmost elevations, the demarcation between the Klamath-enriched mixed conifer habitat and the coastal mixed conifer habitat is not very clear. Klamath-enriched mixed conifer habitat has a larger number of conifer species, whereas the coastal mixed conifer habitat is dominated by white fir and Douglas-fir as well as hardwood species including Pacific madrone and tanoak. Numerous but small meadows and seeps occur throughout this habitat, contributing greatly to wildlife diversity. At lower elevations on its eastern border, the Klamath-enriched mixed conifer habitat interfaces with several habitats including Sierran mixed conifer, ponderosa pine, montane hardwood-conifer and mixed chaparral. On drier or very rocky sites or on rock outcrops, montane chaparral habitat occurs at the same elevation as Klamath-enriched mixed conifer habitat. At the upper elevation of this habitat, it interfaces with the subalpine conifer habitat.

Wildlife Considerations-- The Klamath-enriched mixed conifer habitat covers a moderately large area in northwestern California. Extensive glaciation combined with complex geology has led to highly diverse vegetation, soils and wildlife habitats. A wide array of nesting and feeding opportunities and thermal cover for wildlife has resulted. Proctor (1980) lists the wildlife species that use this habitat at various successional stages. Rare, threatened or endangered wildlife in this habitat include spotted owl, peregrine falcon, wolverine, and Siskiyou Mountain salamander.

Physical Setting

The Klamath-enriched mixed conifer habitat occupies a complex of mountain ranges in northern California which are characterized by rugged, deeply dissected terrain with steep slopes due to extensive glaciation. This area has a considerable amount of ultramafic parent material and soils with scattered areas of serpentinitic soils; it also overlays a very old and complex geological structure. Average slopes are 60 percent or more and valleys are narrow. Soils found at higher elevations are predominantly Xerochrepts and Xerumbrepts and are generally very gravelly or cobbly. There are scattered areas of shallow unproductive soils such as Xerochrepts, or Xeralfs overlying peridotite and serpentine rock formations (Proctor 1980). There are also extensive areas of more productive Alfisols (B. Adamson, Shasta-Trinity National Forest, Redding, Calif., pers. comm.).

Climatic conditions include warm, wet winters and hot dry summers Mean monthly temperatures during the hottest month of the year range from 14 to 22 C (57 to 72 F). During the coldest month of the year temperatures range from 10 to 8 C (15 to 46 F). Mean annual temperature is approximately 11 C (52 'F) (Proctor 1980). Precipitation varies from 177 cm (69 in) on the western (maritime) side to 60 cm (24 in) on the eastern (continental) side. Most of the precipitation occurs during winter with generally less than 15 percent of precipitation falling during summer. Snowfall is moderate, ranging from 3 to 150 cm (2 to 60 in), with large amounts of snowfall occurring at the middle and high

elevations where this habitat occurs. In years of heavy snowpack, the snow field may remain through the summer on north- and east-facing slopes above 1850 m (6160 ft) (Sawyer and Thornburgh 1974, Proctor 1980).

Distribution

The Klamath-enriched mixed conifer habitat is located within the Klamath Region, a geologically defined area in northwestern California comprised of a complex of mountain ranges including the Scott, Salmon, Marble, and southern Siskiyou Mountains, and the Trinity Alps. This habitat is normally found between 1350 2100 m (4500 - 6900 ft) and is restricted to the Klamath Region of northern California and southwestern Oregon.

Literature Cited

Cheatham, N. H., and J. R. Haller. 1975. An annotated list of California habitat types. Univ. of California Natural Land and Water Reserve System, unpubl. manuscript

Kuchler, A. W. 1977. Appendix: the map of the natural vegetation of California. Pages 909-938 In M. G. Barbour and J. Major, eds, Terrestrial vegetation of California. John Wiley and Sons, New York.

Munz, P. A., and D. D. Keck. 1973. A California flora with supplement. Univ. of California Press, Berkeley.

Parker, I., and W. J. Matyas. 1981. CALVEG: a classification of Californian vegetation. U.S. Dep. Agric., For. Serv., Reg. Ecol. Group, San Francisco.

Proctor, C. M., J. C. Garcia, D. V. Galvin, G. B. Lewis, and L. C. Loehr. 1980. An ecological characterization of the Pacific Northwest Coastal Region. U.S. Dep. Interior, Fish and Wildl. Serv. FWS/OBS - 79/11 through 79/15.

Sawyer, J. O., and D. A. Thornburgh. 1974. Subalpine and montane forests on granodiorite in the central Klamath Mountains of California. Unpubl. Rep. to Pacific Southwest Forest and Range Exp. Sta., Berkeley, Calif.

Sawyer, J. O., D. A. Thornburgh, and J. R. Griffin. 1977. Mixed evergreen forest. Pages 359-382 In M. G. Barbour and J. Major, eds. Terrestrial vegetation of California. John Wiley and Sons, New York.

Thorne, R F. 1976. The vascular plant communities of California. Pages 1-31 In J. Latting, ed. Plant communities of southern California. Calif. Native Plant Soc. Spec. Publ. 2.

Whittaker, R. H. 1960. Vegetation of the Siskiyou Mountains, Oregon and California. Ecol. Monogr. 30:270-338.